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Studies on the Rocky Mountain Flora.—IV

BY P. A. RYDBERG

***Arnica tomentulosa* sp. nov.**

A leafy perennial with slender horizontal rootstock. Stem villous, about 4 dm. high: leaves oblanceolate, obtuse, sessile or the lower with short-winged petioles, denticulate, finely villous-pubescent, almost tomentulose, with two pairs of stronger veins, the larger 13 dm. long, somewhat yellowish: heads few, hemispherical; disk about 15 mm. high and 2 cm. broad: bracts ovate or ovate-oblong, obtuse, villous, 12–16 in number: rays light yellow, over 1 cm. long, 4 mm. wide.

This species is nearest to *A. mollis*, but differs in the broad obtuse involucre bracts. It grows at an altitude of about 2700 m.

WYOMING: Buffalo Fork, 1897, *F. Tweedy*, 523.

***Arnica tenuis* sp. nov.**

A low slender perennial with horizontal rootstock. Stem sparingly villous pubescent, about 2 dm. high, monocephalous: leaves usually 3 pairs, sparingly villous when young, entire; the lower two pairs oblanceolate or spatulate, the upper lanceolate: involucre turbinate-campanulate, villous, about 13 mm. high, 10–12 mm. broad: bracts linear, 1–1.5 mm. wide, green; rays orange, 16–18 mm. long and 4 mm. wide.

This species resembles *A. gracilis* in the size of the plant and form of the head, but the leaves are much narrower and the heads solitary. It is intermediate between that species and *A. fulgens*. It grows at an elevation of about 2200 m.

WYOMING: Big-Horn Mountains, 1899, *F. Tweedy*, 2094.

***Artemisia diversifolia* sp. nov.**

A white tomentose perennial with horizontal rootstock. Stems simple, leafy, white-tomentose, 5–10 dm. high: leaves densely tomentose on both sides, subsessile, 5–10 cm. long: the lower pinnately cleft into 3–5 narrowly lanceolate acuminate lobes, which are directed forward: the upper entire, linear-lanceolate, passing into the bracts of the inflorescence: inflorescence a narrow panicle, 1.5–3 dm. long: heads numerous, conglomerate, sessile, 3–4 mm. high and 3 mm. broad: bracts oblong or ovate-oblong, scarious-

marginated, densely villous-tomentose: flowers heterogamous, but all fertile, light yellow: receptacle glabrous.

This species belongs to the *A. Ludoviciana* group, and in many respects agrees with the original description thereof. It is, however, a western species, not growing near the region from which *A. Ludoviciana* was described. What the latter really is I have been unable to settle. The one that I think is the only one that has any claim for the name, is a lower plant from Missouri to Colorado, with shorter leaves, more green above, with more divergent lobes and brownish flowers. *A. diversifolia* grows on sandy beaches up to an altitude of 2200 m.

IDAHO: Priest River, 1900, *D. T. MacDougal*, 190 (type); Farmington Landing, Lake Coeur d'Alene, 1892, *Sandberg, MacDougal & Heller*, 509.

WASHINGTON: 1889, *G. R. Vasey*, 479.

WYOMING: Yellowstone Lake, 1899, *Aven & Elias Nelson*, 6603.

***Picradenia helenioides* sp. nov.**

A comparatively tall, finely pubescent plant with apparently only biennial root. Stem leafy, about 5 dm. high, with several to many erect branches: leaves rather firm, distinctly ribbed, finely pubescent; the lower petioled and with half clasping bases: basal leaves entire, very narrowly linear-oblancoate; middle stem-leaves erect, fully 1 dm. long, parted into 3-5 linear divisions: upper stem-leaves linear, entire: heads corymbose: involucre somewhat tomentose, 8-10 mm. high and often 15 mm. broad; outer bracts united only at the base, lanceolate, longer than the inner, 14-18 in number: rays orange, about 1 cm. long, 2-3 mm. wide, 3-toothed at the apex: achenes silky: scales of the pappus broadly lanceolate, acuminate.

It is nearest related to *P. biennis* (A. Gray) Greene; but differs in the yellowish green herbage, the erect branches, the broader segments of the leaves and the darker flowers. It grows in mountain valleys at an altitude of about 2700 m.

COLORADO: On Sangre de Christo Creek, 1900, *Rydberg & Vreeland*, 5495.

***Antennaria Piperi* sp. nov.**

Somewhat surculose-rosuliferous: basal leaves 2-4 cm. long, obovate or oval with a short petiole, densely floccose on the lower surface, only slightly so on the upper surface when young, but

soon glabrate, 1-ribbed or indistinctly 3-ribbed, generally distinctly mucronate : flowering stems 1-1.5 dm. high, somewhat glanduliferous above ; its leaves small and bractlike, oblanceolate or linear ; heads 5-7 in a short raceme : fertile heads 7-8 mm. high and 6-7 mm. in diameter ; its bracts imbricate in about 4 series, slightly floccose, green at the base, purplish in the middle and with a light brownish scarious margin above ; the outer short and ovate ; the inner lanceolate, acute : pappus very slender, filiform, dirty white ; sterile heads about 5 mm. high and about as broad ; its bracts broadly oblong, more floccose, brown and with a broader scarious margin of the same color as in the fertile head, obtuse or truncate ; pappus only slightly broadened above, white.

It is nearest related to *A. racemosa*, but differs in the more copious and more persistent tomentum, in the broader and brighter colored bracts of the fertile head and the broad scarious margins of those of the sterile one.

OREGON : Olympic Mountains, 1895, *C. V. Piper* (fertile plant in herbarium of Washington Experiment Station, Pullman) ; mountains of northern Oregon, *Wilkes Expedition* (sterile plant in the Torrey herbarium).

***Aster mollis* sp. nov.**

A strict perennial with a horizontal rootstock. Stem densely villous, almost tomentose, or in age more glabrate, 4-8 dm. high, simple below, with short flowering branches above ; leaves obovate to oblanceolate, 5-10 cm. long, densely and softly grayish pubescent on both sides, sessile, slightly clasping, and occasionally a little auricled at the base : heads terminating the short branches, hemispherical ; disk about 15 mm. high and broad ; bracts herbaceous, oblong, obtuse, villous-pubescent ; rays numerous, bluish purple, about 1 cm. long and 2 mm. wide.

This species reaches an elevation of 2200 m.

WYOMING : Big-Horn Mountains, 1899, *F. Tweedy*, 2029 (type).

WASHINGTON : Pullman, 1893, *C. V. Piper*, 1604.

***Townsendia Vreelandii* sp. nov.**

A dark green biennial, branching near the base. Stems and branches simple, erect, 1.5-4 dm. high, mostly erect, sparingly villous. Leaves numerous, all oblanceolate, short-petioled, glabrous, mucronate, 4-8 cm. long, 5-8 mm. wide : involucre about 15 mm. high and 25-30 mm. broad : bracts lanceolate, acuminate, scarious, light green with dark green center : rays

bluish purple, 12–15 mm. long, 2 mm. wide : achenes thin, oblong, truncate : pappus of 2 subulate bristles, with a few intermediate squamellae.

It is nearest related to *T. eximia*, but has larger heads, is more leafy, and even the upper leaves are oblanceolate. It grows at an altitude of 2500–3000 m.

COLORADO : Side of Veta Mountain, 1900, *F. K. Vreeland*, 639 (type); Veta Pass, 1900, *Rydberg & Vreeland*, 5404 and 5405; West Spanish Peak, 5406.

***Erigeron leucotrichus* sp. nov.**

Perennial with a somewhat branching rootstock. Stems about 2 dm. high, sparingly villous below, more copiously so above : basal leaves oblanceolate or spatulate, 3–5 cm. long, short-petioled, bright green and sparingly hairy : stem-leaves oblanceolate to linear, 1–2 cm. long ; head solitary ; involucre white-villous with multiceptate hairs ; bracts very numerous, lanceolate, almost black, acuminate with spreading tips : rays very numerous, about 6 mm. long and 1 mm. wide, light purplish pink or white.

This species is nearest related to *E. melanocephalus*, but easily distinguished from it by the white, not black, hairs of the involucre. It differs from *E. simplex* in the taller habit, the larger heads and the darker bracts of the involucre. It grows at an altitude of about 2500 m.

WYOMING: Big-Horn Mountains, July, 1899, *Frank Tweedy*, 2003.

***Erigeron incanescens* sp. nov.**

(?) *Erigeron glabellus* var. *mollis* A. Gray, Proc. Acad. Phil. 1863 : 64, in part.

A densely and finely cinereous pubescent plant with perennial rootstock. Stem simple, 1.5–3 dm. high, mostly ascending, striate densely pubescent, leafy : basal leaves oblanceolate or spatulate : stem-leaves about 5 cm. long and 1 cm. wide, oblong, oblanceolate or the upper lanceolate, sessile and somewhat clasping : heads 1–4 ; disk about 8 mm. high and 15 mm. broad : bracts very numerous in one series, narrowly linear, cinereous as the rest of the plant ; rays pale blue or violet, very numerous, about 15 mm. long and less than 1 mm. wide.

From Dr. Gray's description, this species must have been included in *E. glabellus* var. *mollis* ; but all specimens that I have

seen under that name belong to *E. subtrinervis* Rydb., which is its nearest relative. From this it differs in the dense grayish pubescence, the narrower stem-leaves, which are not 3-ribbed, and the lower habit. *E. incanescens* grows in rocky places at an altitude of about 3000 m.

COLORADO: West Spanish Peak, 1900, *Rydb. & Vreeland*, 5415.

***Erigeron viscidus* sp. nov.**

A low caespitose perennial. Stems ascending, a little over 1 dm. high, more or less hirsute and glandular-puberulent, especially above; leaves 3–5 cm. long, oblanceolate, dark green, sparingly hirsute and ciliate on the entire margins: heads few: disk about 1 cm. high and 15 mm. broad: bracts very numerous, subequal in one series, narrowly linear, fuscous, acuminate, glandular-puberulent, but not hirsute: rays very numerous, pale blue, about 8 mm. long and .5 mm. wide.

This species is intermediate between *E. glandulosus* and *E. macranthus*. It has the habit of the former, although larger, and the large heads and numerous narrow rays of the latter. It grows in wet ground, at an altitude of about 2700 m.

COLORADO: Near the Gray-Back Mining Camps, 1900, *Rydb. & Vreeland*, 5416.

***Valeriana acutiloba* sp. nov.**

A bright green plant with horizontal or ascending rootstock and polygamo-dioecious flowers. Fertile plant 4–5 dm. high: basal leaves entire with a short wing-margined petiole, 5–7 cm. long; blade spatulate or obovate, acute: stem-leaves usually 3 pairs, pinnately divided; lateral divisions lanceolate to linear, long-acuminate; the terminal one large, oblanceolate or of the uppermost very small leaves linear-lanceolate, entire or saliently toothed: cyme dense, contracted, 2–5 cm. long and about as wide; glandular-puberulent: bracts linear subulate, about 1 cm. long: flowers perfect; corolla funnelform, about 4.5 mm. long; tube proper about 1 mm.; fruit broadly ovate, about 4 mm. long: pappus about 7 mm.: staminate plant lower, 3–4 dm. high, with more sterile shoots, which have much longer leaves: stem-leaves usually only 2 pairs, less divided, with only 1–2 pairs of lateral divisions: cymes denser, flowers all or nearly all staminate: their corollas larger, 5–6 mm. long, more oblique; the limbs about 5 mm. wide.

This species has the dense cyme of *V. capitata*; but the plant is taller, the corolla shorter and is easily distinguished from all its

American relatives by the narrow, long-acuminate divisions of its stem-leaves. It grows in wet places, especially under snowdrifts, at an altitude of 2500–3300 m.

COLORADO: Near Gray-Back Mining Camp, Sangre de Christo Range, 1900, *Rydberg & Vreeland*, 5576 (type, fertile plant); Mountain near Veta Pass, 5575 (staminate plants); Bear Creek Cañon, 1895, *Ernst A. Bessey* (fertile); Pagosa Peak, 1899, *C. F. Baker*, 620.

***Campanula MacDougalii* sp. nov.**

A slender glabrous perennial, about 3 dm. high with slender horizontal rootstock. Leaves very thin: the basal ones and lower stem-leaves with slender petioles 2–4 cm. long; blades broadly ovate, 2–3 cm. long, coarsely sinuate-dentate: upper stem-leaves lanceolate to linear, entire; the largest 5–6 cm. long; sepals linear subulate, 10–12 mm. long, at last reflexed: corolla 13–15 mm. long, nearly of the same shape as that of *C. rotundifolia*: style exserted, straight: fruit not seen.

The species is nearest related to *C. Scouleri*; but is easily distinguished from that species by the lack of the sharp toothing of the leaves. The lower leaves resemble somewhat those of *C. rotundifolia*, and were it not for the exserted style and the smaller corolla it may be referred to the var. *Alaskana* of that species.

IDAHO: Priest Lake, 1900, *D. T. MacDougal*, 66.

***Castilleja linearis* sp. nov.**

A rather slender perennial, with a rootstock. Stem simple, 3–4 dm. high, finely villous pubescent: leaves narrowly linear, about 5 cm. long and 2 mm. wide, pubescent, entire or the upper with a pair of narrowly linear lobes: bracts broader, deeply cleft into three linear lobes, tipped with brick-red: calyx villous, 2–2.5 cm. long, cleft almost equally deeply in front and behind, more than half way down: lateral lobes linear, 8–10 mm. long: corolla 2.5–3 cm. long, greenish yellow: galea about 12 mm. long, with red margins: lower lip dark green, about 3 mm. long, 3-lobed.

This species resembles in habit most the subarctic *C. pallida*, but has the corolla of *C. mineata*. It grows in meadows at an altitude of about 2500 m.

COLORADO: Near West Spanish Peak, 1900, *Rydberg & Vreeland*, 5619.

Castilleja trinervis sp. nov.

A tall perennial with rootstock. Stem more or less villous, especially the upper portion, solitary, simple or branched, 3–6 dm. high: leaves dark green, finely puberulent, entire, acute, usually 3-ribbed; the lower linear, 5–8 cm. long and about .5 cm. wide; the upper lanceolate and often 15 mm. wide: lower bracts green, similar but shorter and broader and usually 3–5-lobed: the upper with almost crimson tips: calyx densely white villous, about 3 cm. long, equally cleft in front and behind, each division laterally cleft into two oblong lobes, 5–8 mm. long, tipped with the same color as the bracts: corolla about 4 cm. long, slightly curved, green, but the galea with almost crimson margins: galea about 15 mm. long: lower lip 4–5 mm. long, dark green, with three narrow lobes: style about 5 mm. longer than the corolla.

This species is nearest related to *C. rhexifolia* and *C. confusa*, but is characterized by the copious white villous pubescence of the upper part of the stem and the calyx. It grows in open woods at an altitude of 2700–3000 m.

COLORADO: Headquarters of Sangre de Christo Creek, 1900, *Rydberg & Vreeland*, 5620 (type); Gray-Back Mining Camps, 5621.

Castilleja luteovirens sp. nov.

A simple perennial with rootstock, often turning black in drying. Stem 3–4 dm. high, leafy, slightly pubescent when young, soon glabrate, except the upper portion which is slightly villous: leaves lanceolate to almost linear, 3–4 cm. long, 3–9 mm. wide, finely puberulent, 3-ribbed, acute, entire, or rarely the upper 3-lobed: lower bracts ovate, obtuse, entire, tipped with light greenish yellow or greenish white; the upper ones 3-toothed at the apex and greenish yellow throughout: calyx villous, 15–17 mm. long, almost equally cleft in front and behind, laterally cleft about 3 mm.; lobes lanceolate: corolla 22–24 mm. long, greenish; galea 6–7 mm. long with yellow margins; lower lip 2.5–3 mm. long, bluntly 3-lobed.

This species has been referred to *C. septentrionalis* and *C. pallida*, but differs from both in the broader, less acuminate leaves and broader, more entire yellowish bracts. Neither of the two species mentioned is found in the southern Rockies. Mostly all the material that has been determined as either belongs to the present species. This grows in meadows at an altitude of 1200–2700 m.

COLORADO: Sangre de Christo Creek, 1900, *Rydberg & Vree-*

land, 5616 (type) and 5617; Wahatoya Creek, 5618; Middle Park, 1861, *C. C. Parry*, 241; Chicken Creek, 1898, *Baker, Earle & Tracy*, 374; near Denver, 1869, *B. H. Smith*; Ford of Chama, 1859, *Newberry*, in Macomb's Expedition; Seven Lakes, Pikes Peak, 1894, *Ernst A. Bessey*.

WYOMING: Big-Horn Mountains, 1899, *F. Tweedy*, 2340; Laramie Plain, 1884, *C. S. Sheldon*, 80.

UTAH: Salt Lake City, 1879, *M. E. Jones*, 1051.

***Mimulus gratioloides* sp. nov.**

A low, branched annual of more or less reddish color, generally less than 1 dm. high, somewhat viscid puberulent especially above. Leaves oblong-lanceolate, sessile, about 1 cm. long, sinuate-dentate: pedicels slender, in fruit 15–20 mm. long; calyx 7–8 mm. long, cylindraceous in fruit: lobes subequal, short, broadly ovate, acute, ciliate on the margins; corolla yellow, about 1 cm. long and 3 mm. broad, only slightly bilabiate: throat beardless.

This species is nearest related to *M. rubellus* and the specimens from Colorado referred to that species may belong here. *M. gratioloides* differs, however, in the smaller yellow corolla and the acute calyx-lobes. It grows in exposed places among rocks and gravel at an altitude of about 2300 m.

COLORADO: Butte, 5 miles southwest of La Veta, 1900, *Rydberg & Vreeland*, 5660.

***Pedicularis lunata* sp. nov.**

A perennial, perfectly glabrous up to the inflorescence, with a rather stout, but simple rootstock: stem about 4 dm. high, slightly striate and purplish: leaves alternate, dark green, 5–12 cm. long, pinnately divided to near the midrib; segments linear or linear-oblong, crenate: spike 15–20 cm. long, rather lax; bracts pectinately divided with prolonged endlobes, the lower often equaling the flowers in length, slightly arachnoid villous: calyx about 9 mm. long; its teeth broadly lanceolate, about 3 mm. long: corolla pinkish, over 2 cm. long; its tube about twice as long as the calyx, strongly curved; galea strongly arcuate, produced into a rather long beak and almost crescent-shaped; lower lip almost meeting the beak of the upper, very broad, indistinctly 3-lobed with large rounded lateral lobes.

The very broad lower lip, and long-beaked galea suggest somewhat *P. contorta* and *P. ctenophora*, but the corolla-tube is

much longer and the beak not spirally twisted. The species may therefore be placed with *P. Canbyi*, *P. Parryi* and *P. Hallii*, but the corolla and beak are much more arcuate. It is a handsome species growing at an altitude of nearly 2800 m.

WYOMING : Big-Horn Mountains, 1899, *F. Tweedy*, 2317 (type).

***Pentstemon erosus* sp. nov.**

A glabrous caespitose perennial, 2–4 dm. high. Basal leaves oblanceolate, short-petioled, 3–5 cm. long, entire, mostly acute : stem-leaves opposite, sessile, oblong or lanceolate, entire, acute or the uppermost acuminate : flowers in a dense interrupted spikelike inflorescence : calyx-lobes broadly ovate, almost cuspidate-acuminate, tinged with dark purple and white and with an erose-dentate margin : corolla purple with very dark limb : lower lip broad with 3 rounded reflexed lobes, bearded on the inside : upper lip with 2 erect narrower lobes : sterile stamens narrowly clavate, short-bearded.

This species is nearest related to *P. procerus*, but easily distinguished by the erose sepals and more reflexed lower lip. It grows at an altitude of 2000–2700 m.

COLORADO : Indian Creek Pass, 1900, *F. K. Vreeland*, 615 (type); South Park, 1873, *John Wolfe* (Wheeler Expedition), 293 ; Chicken Creek, West La Plata Mountains, 1898, *Baker, Earle & Tracy*, 658.

***Pentstemon Wilcoxii* sp. nov.**

An almost glabrous perennial with a caespitose caudex. Stems 3–6 dm. high, glabrous or slightly puberulent above, simple : leaves opposite, glabrous and somewhat glaucous, dentate with small sharp callous teeth, acute : the basal ones petioled, lanceolate : the lower stem-leaves sessile, oblanceolate or oblong, 3–5 cm. long ; the upper lanceolate and slightly clasping : inflorescence an elongated interrupted thyrses : branches 1–2 cm. long, fastigiate-cymose : calyx glabrous, about 4 mm. long, cleft $\frac{3}{4}$ its length : lobes lanceolate, acute, slightly margined below and there often sinuately toothed : corolla straight, purple, glabrous on the outside, about 15 mm. long ; the lower lip longer than the upper, slightly bearded within : sterile stamen club-shaped, with a short dense brown beard.

This species is probably nearest related to *P. humilis* ; but easily distinguished by the tall stems, the sharper toothed leaves, and the numerous purple flowers.

MONTANA : Kalispell, 1900, E. V. *Wilcox*, 370 (type in United States National Herbarium) and 368.

***Polemonium delicatum* sp. nov.**

A small glandular perennial with slender horizontal rootstock. Stem very slender, about 1 dm. high : leaves 3–8 cm. long ; leaflets 5–11 pairs, very thin, ovate, ovate-lanceolate or oblong, mostly acute, 3–10 mm. long : inflorescence usually branched ; branches 3–4-flowered ; pedicels slender, 5–15 mm. long ; calyx glandular, 4–5 mm. long : lobes lanceolate, acute : corolla blue, open-campanulate, about 7 mm. high and 8 mm. broad : stamens about equalling the corolla.

This is nearest related to *P. parviflorum* Nutt., but is still smaller and characterized by its slender pedicels, small flowers and acute calyx-lobes. It grows at an altitude of over 3000 m.

COLORADO : West Spanish Peak, 1900, *Rydberg & Vreeland*, 5720 (type).

COLORADO OR NEW MEXICO : Canadian ?, *Dr. James*.

***Polemonium speciosum* sp. nov.**

A low viscid-villous plant, caespitose with a perennial rootstock. Stem 1–2 dm. high with 2–3 leaves : basal leaves numerous, 8–15 cm. long with wing-margined rachis ; leaflets opposite, 7–9 pairs, ovate, 6–12 mm. long, acute : stem-leaves similar but smaller : inflorescence capitate : calyx viscid-villous, 15–20 mm. long, cleft to about the middle : lobes lanceolate, acute : corolla pale blue, deeply campanulate-funnelform, 2–2.5 cm. long : limb about 1.5 cm. broad.

The form of the corolla, the dense capitate inflorescence and the viscid pubescence place this species nearest *P. viscosum*, and *P. confertum*, but the leaflets are not verticillate, the corolla is larger than that of the former and broader than in the latter.

COLORADO : Mount Garfield, 1900, *Fred. Clements*.

***Gilia candida* sp. nov.**

A glandular perennial with short caudex. Stems often more than one, ascending or erect, simple, 4–6 dm. high, leafy : leaves rather fleshy, divided into linear-filiform, spinulose-tipped segments ; the upper gradually smaller : inflorescence a very narrow panicle : branches usually very short and few-flowered : flowers subsessile : calyx glandular-pubescent, about 8 mm. long ; its lobes lanceolate, bristle-tipped : corolla white, or rarely pale pink, 2–3

cm. long, salverform: its lobes oval or obovate, obtuse: stamens inserted unequally below the throat, included.

This species is nearest related to *G. aggregata*; but differs in the white corolla and its rounded obtuse lobes. It is also lower and the upper leaves more reduced. It grows on dry hillsides at an altitude of 2000–2700 m.

COLORADO: Mesas near La Veta, 1900, *F. K. Vreeland*, 602 (type); Veta Pass, 1900, *Rydberg & Vreeland*, 5730; Calham, 1893, *De A. Saunders*.

***Phacelia alba* sp. nov.**

A viscid-villous annual or biennial, 2–4 dm. high. Stem leafy, strict and simple viscid-villous and glandular above: leaves twice interruptedly pinnatifid, about 1 dm. long, glandular-puberulent, hispid ciliolate on the margins and veins; ultimate segments ovate or oblong, 3–6 mm. long: inflorescence branched, dense, in flowers almost capitate, but branches in fruit spiciform: flowers nearly sessile, 2-ranked: calyx glandular, cleft to near the base; sepals broadly linear, obtuse, about 2 mm. long, about one third shorter than the white corolla: the lobes of the latter rounded, crenate: appendages 10, broadly ovate: stamens and style much exserted: capsule ovoid, about 6 mm. long: seeds often solitary in each cavity, finely pitted.

This species is nearest related to *P. Neo-Mexicana* and *P. Popei*, resembling the latter most in habit, but having the viscid-pubescent and the crenate corolla-lobes of the former. It differs from both in the small white corolla and the long-exserted stamens. It grows in mountain valleys at an altitude of 1800–3000 m.

COLORADO: Sangre de Christo Creek, 1900, *Rydberg & Vreeland*, 5755 (type); Valley of Upper Arkansas River, 1873, *John Wolfe* (Wheeler Expedition), 99; Headwaters of Clear Creek, 1861, *C. C. Parry*, 314.

NEW MEXICO: Ruidoso Creek, White Mountains, 1895, *E. O. Wootton*.

***Lappula calycosa* sp. nov.**

A hirsute annual, simple below, branched above with long virgate branches. Stem hirsute, 3–4 dm. high: leaves oblong, obtuse, 3–4 cm. long, 7–8 mm. wide; those of the branches smaller: pedicels short, in fruit 2–3 mm. long, generally 4 mm. below the leaves; corolla pale blue, about 1.5 mm. long and 1 mm. broad: calyx-lobes enlarged in fruit, foliaceous, 4–6 mm.

long and reflexed: fruit about 4 mm. in diameter: nutlets surrounded by a single row of subulate glochinate prickles, somewhat flattened at the base but not united into a wing-border: back of the nutlets strongly muricate.

It is nearest related to *L. occidentalis* (Wats.) Greene, but differs in the oblong obtuse leaves, the enlarged and reflexed fruiting calyx-lobes, and the virgate branches. It grows in deserted fields at an altitude of about 2000 m.

COLORADO: Walsenburg, 1900, *Rydberg & Vreeland*, 5715.

***Lappula cupulata* (A. Gray)**

Echinosperrum Redowskii var. *cupulata* A. Gray, Bot. Calif. 1: 530. 1876.

I think that this should be regarded as distinct from *L. Texana* (Scheele) Britton, as the habit is quite different. *L. cupulata* is diffuse, branching at the base, with elongated branches, while *L. Texana* is simple at the base, and branched above with short branches.

L. Texana is a southern plant, ranging from Texas to New Mexico. The range of *L. cupulata* is from Nevada to Nebraska, south to Colorado.

***Cryptanthe minima* sp. nov.**

A dwarf hirsute annual, beginning to bloom when only 1 cm. high. Stems several, erect, in the specimens seen only 1-4 cm. high, long hirsute: leaves spatulate or oblanceolate obtuse, hirsute on both sides, 5-15 mm. long and 2-3 mm. wide: flowers crowded, 2.5-3 mm. long, subsessile: lobes of the calyx linear, hispid: corolla white; limb a little over 1 mm. broad; nutlets whitish, about 1 mm. long, dissimilar; 3 ovoid, strongly muricate; the fourth somewhat larger, smooth; the inside edge with a slender groove, triangular-dilated at the base.

In size and general habit, this species is strikingly like *C. pusilla*; but the fruit is different; the nutlets being dissimilar, one of them smooth, and all with rounded lateral angles and more rounded backs. The specimens of our collection are rather young and only two fully developed fruits were found. *C. minima* was found on dry hillsides at an altitude of about 2200 m.

COLORADO: Cucharas River, above La Veta, 1900, *Rydberg & Vreeland*, 5697.

Mertensia lineariloba sp. nov.

A slender perennial with glabrous simple stem, 2–3 dm. high, basal leaves 5–15 cm. long, long-petioled; blades oblanceolate, obtuse; stem-leaves subsessile, linear or linear-lanceolate, acute, 3–6 cm. long, 4–9 mm. wide, strigose above, glabrous beneath: flower clusters 3–4-flowered in the axils of the upper leaves; pedicels very slender, 2–6 mm. long, strigose: calyx divided to near the base; lobes linear, acute, 3–4 mm. long, almost equaling the tube of the corolla, glabrous on the back, but hispid ciliate on the margins: corolla blue, 7–8 mm. long, tube nearly of the same length as the throat and limb; the latter 4–5 mm. long: stamens almost equaling the corolla; filaments dilated, and broader than the anthers.

It is nearest related to *M. linearis*, but characterized by the narrow, strongly ciliate calyx-lobes and the filiform pedicels. It grows in shaded situations at an altitude of 2500–2700 m.

COLORADO: West Indian Creek, Trichera Range, 1900, *Rydberg & Vreeland*, 5691 (type); near Empire, 1885, *H. N. Patterson*, 115.

Mertensia ovata sp. nov.

A low caespitose, somewhat fleshy perennial. Stems 1–1.5 dm. high, glabrous: leaves 2–5 cm. long, 1–1.5 cm. wide, minutely strigose above, glabrous beneath; the lower obovate and short-petioled; the upper broadly ovate and sessile: flower-cluster dense; pedicels very short: calyx cleft to near the base: sepals lanceolate, ciliate on the margin, about 4 mm. long and one third shorter than the corolla-tube: corolla 10–12 mm. long; its tube nearly one half longer than the throat and limb: the latter about 7 mm. broad: stamens nearly equaling the corolla; filaments dilated and broader than the anthers.

This species is probably nearest related to *M. lanceolata*; but differs in the stunted habit and the broad leaves. It grows among rocks, at an altitude of 2800–3500 m.

COLORADO: West Spanish Peak, 1900, *Rydberg & Vreeland*, 5690 (type) and 5690a.

Mertensia obtusiloba sp. nov.

A low caespitose perennial. Stems ascending, glabrous, 1–2 dm. high: lower leaves spatulate or oblanceolate, obtuse, tapering into a winged petiole, dark green, glabrous beneath, minutely strigulose above, glabrate in age, 3–5 cm. long; the upper broadly lanceolate, sessile: flower-clusters several from the axils of the

upper leaves : pedicels very short, often sparingly strigulose : calyx divided to near the base ; sepals oblong, obtuse, ciliate on the margins, 2–3 mm. long, scarcely more than half as long as the tube of the corolla : corolla dark blue, about 7 mm. long : tube nearly equaling the throat and limb : stamens short, included in the tube, filaments very short, not broader than the anthers.

This species is nearest related to *M. Tweedyi*, but differs in the shorter, obtuse calyx-lobes, the broader and thinner leaves and the stem which is not depressed or prostrate. It grows at an altitude of 2000–3500 m.

COLORADO : Pikes Peak, 1900, *Fred. Clements* (type) ; Garden of the Gods and Pikes Peak, 1894, *Ernst A. Bessey* ; Argentine Pass, 1878, *Marcus E. Jones*, 54.

***Mertensia membranacea* sp. nov.**

A tall erect perennial with a rather thick tap-root. Stem glabrous or sparingly hirsute above, 6–8 dm. high : leaves all petioled, or the upper sessile ; blades ovate, acute or more often short acuminate, 4–8 cm. long, 1.5–4 cm. wide, very thin, hispid-stringulose on both sides : flower-clusters terminal and in the axils of the upper leaves, branched and many-flowered : pedicels 5–10 mm. long, hispidulous : calyx-lobes 2–3 mm. long, hispidulous, lanceolate, acute, one-third or one-fourth as long as the tube of the corolla : corolla about 1 cm. long ; the pale blue or almost white tube longer than the dark blue limb and throat : limb about 4 mm. broad : stamens much shorter than the limb ; filaments dilated and broader than the anthers : nutlets strongly rugose and spotted.

This species is related to *M. paniculata*. Mr. Bessey and myself collected it in 1897, but as the specimens were rather poor, they were referred doubtfully to that species. As more and better specimens have now been received, it has been possible to draw a description. It differs from *M. paniculata*, in the thinner leaves which almost always show an acumination, in the short calyx-lobes which scarcely enlarge in fruit and the smaller and numerous flowers. It grows in moist places at an altitude of 300–2000 m.

IDAHO : Priest River, 1900, *D. T. MacDougal*, 3 (type) ; Cedar Mountain, 1892, *Sandberg*, *MacDougal & Heller*, 420.

MONTANA : Electric Peak, 1897, *Rydberg & Bessey*, 4864.

***Mentzelia ctenophora* sp. nov.**

A diffuse caespitose scabrous perennial. Stems 3–6 dm. long, branched, in age straw-colored : lower leaves linear or linear-lan-

ceolate in outline, tapering at both ends, often 2 dm. long : the upper lanceolate with a broad base : all pectinately lacinate with linear-oblong divergent obtuse lobes ; hypanthium cylindrical, 15–18 mm. long ; sepals ovate-lanceolate, acute, 4–5 mm. long : petals obovate, light yellow, about 8 mm. long : seeds irregularly angled, but not winged, finely muricate.

This species is perhaps nearest related to *M. albicaulis*, but differs in the large size of the plant, the diffuse habit, and the larger flowers. It was collected on railroad banks and in loose barren soil on hillsides, at an altitude of 1800–2100 m.

COLORADO : On Cucharas River, below La Veta, 1900, *Rydberg & Vreeland*, 5769 (type) ; near Walsenburg, 5768.

***Impatiens aurella* sp. nov.**

A slender glabrous annual, about 6 dm. high. Petioles 1.5–3 cm. long : leaf-blades ovate or oval, thin, bright green, a little paler beneath, 4–5 cm. long, coarsely toothed, acute ; teeth and apex finely mucronate : peduncles ascending, mostly 2-flowered : bracts minute, linear, about 2 mm. long : flowers orange, not mottled : sack conical, about 1 cm. long and 6 mm. broad at the base ; its spur recurved, about 8 mm. long.

This is nearest related to *I. biflora*, but differs in the much smaller flowers, which are scarcely more than half the size of that species and without any spots, the comparatively longer spur and less pale leaves. It grows in swamps at an altitude of about 600 m.

IDAHO : Priest River, 1900, *D. T. MacDougal*, 20.

***Geranium nervosum* sp. nov.**

A tall perennial with thick root and short caudex. Stems 4–8 dm. high, minutely retrorsely strigose, in age more glabrate : basal leaves with petioles 2–4 dm. long ; blades reniform in outline, 8–12 cm. in diameter, finely strigose on both sides, divided to near the base into 5–7 obovate-cuneate or oblanceolate-cuneate divisions which are again 2–3-cleft and coarsely toothed : stem-leaves none, except those subtending the inflorescence ; these sessile, 3–5-cleft ; branches of the cymes and calyx very densely glandular pubescent : sepals oval, 8–9 mm. long, terminated by a filiform tip, 1–2 mm. long : petals broadly obovate, 15–18 mm. long, pale violet or almost white, with dark purple streaks : carpels as well as their column densely glandular ; the latter nearly 2 cm. long : style beyond the column about 5 mm. : seeds glabrous, minutely reticulate.

This species is somewhat intermediate between *G. viscosissimum*

and *G. Richardsonii*, having the general habit, the leaves and pubescence of the stem of the latter, but the densely glandular pubescence of the inflorescence and the calyx and carpels of the former. The color of the flower is most like *G. Richardsonii*, but scarcely pure white and with much more prominent veins. It grows at an altitude of 1800–2700 m.

WYOMING: Fish Creek, Teton Forest Reserve, 1897, *F. Tweedy*, 494 (type).

COLORADO: Continental Divide, Routt County, 1894, *C. S. Crandall*.

***Lupinus candicans* sp. nov.**

A low caespitose perennial, densely white-silky throughout. Stems ascending, 1.5–2 dm. high, 3–4-leaved, often branched: stipules linear subulate, 5–8 mm. long: petiole 3–8 cm. long: leaflets about 7, densely white-silky and shining, 1.5–2.5 cm. long, oblanceolate, acute, mucronate, mostly conduplicate: raceme rather dense, 3–8 cm. long on a peduncle 2–5 cm. long: bracts small and early deciduous: calyx densely silky-villous, only slightly saccate on the upper side; lower lobe about 4 mm. long: banner dark blue with a light brown spot, about 7 mm. long, very broad, and with the sides strongly reflexed; wings dark blue, as well as the banner glabrous, about 9 mm. long and about equaling the keel: the latter whitish, tipped with dark purple: pod densely white-silky, 3–4-seeded.

This species has the white pubescence of *L. sericeus* and *L. Hellerae*; but is in every way a much smaller and more caespitose plant: the flowers are much smaller and of a darker and more intense blue.

MONTANA: (locality not given), 1900, *E. V. Wilcox*, 451 (type in U. S. Nat. Herb.); Boulder, 125 and 129, in part; Big Timber, 385; Highwood Mountains, 42; Columbia Falls, 1897, *R. S. Williams*.

***Lupinus cyaneus* sp. nov.**

A stout and tall perennial with rather simple caudex. Stem 4–9 dm. high, densely villous, but not white, very leafy and in age somewhat branched: stipules subulate, over 1 cm. long: petioles 5–10 cm. long: leaflets 7–11, oblanceolate, 3–9 cm. long, glabrous above, almost velvety beneath, acute: raceme long and dense, 1.5–2 dm. long: bracts rather persistent, often over 1 cm. long: flowers very numerous, 2–4 in each verticil, very short-pedicelled: calyx white-velvety, somewhat saccate above: lower lobe about

8 mm. long: banner slightly hairy on the back, light blue, with a light brownish spot at the center, about 8 mm. long: wings light blue, about 1 cm. long, equaling the keel, which is whitish with purple tip: pod densely silky-villous, about 25 mm. long and 8 mm. wide, 4-5-seeded.

This species has the general habit and the long dense raceme of *L. leucophyllus*, but is much greener and the flowers are much smaller and lighter in color. No. 435, cited below, is referred here doubtfully. It is more silvery and more branched and had apparently almost white flowers.

MONTANA: (locality not given), 1900, *E. V. Wilcox*, 446 (type in U. S. Nat. Herb.); Coal Spur, 435 (?) and 449 (the latter in fruit); Gallatin Valley, 1896, *J. H. Flodman*, 617.

***Astragalus sulphureus* sp. nov.**

A light green caespitose perennial. Stems ascending, about 4 dm. high, angled, glabrous, somewhat branched: stipules ovate to lanceolate, membranaceous, free from the petioles: leaflets 13-19, elliptic, obtuse or acutish, mucronulate, 12-30 mm. long, with a few scattered strigose hairs: spike dense and elongated: flowers ascending: bracts lanceolate-subulate, about 8 mm. long: calyx white-strigose with scattered black hairs: tube about 5 mm. long: lobes almost filiform, fully 5 mm. long: corolla light yellow: banner narrow, 15-18 mm. long, much exceeding the wings and keel: wings very narrow, only about 1.5 mm. wide: pod 2-celled, with dorsal suture deeply inflexed, deeply obcordate in section, about 1 cm. long, 3-4 mm. wide, strigose, with black hairs.

This species is closely related to *A. adsurgens*, but differs in the yellow, ascending flowers, narrow petals, more scant pubescence, the long slender calyx lobes and the black hairy pod. It grows at an altitude of 1600-3000 m.

COLORADO: Georgetown, 1895, *P. A. Rydberg* (type); along Platte River, Denver, 1878, *M. E. Jones*, 851.

***Aragallus villosus* sp. nov.**

Densely and intricately caespitose perennial. Leaves basal, numerous, 5-10 cm. long: leaflets 25-31, rather crowded but not verticillate, 1-1.5 cm. long, lanceolate, very acute, densely but somewhat loosely silky: scape about 1.5 dm. long, loosely silky, almost hirsute, with spreading hairs: spike dense, 4-5 cm. long: bracts linear or narrowly linear-lanceolate, 8-10 mm. long: calyx

white-silky villous; lobes very short, about 2 mm. long: corolla ochroleucous without any purple, 12–15 mm. long: keel very short and round, abruptly tipped with a small tip: pod thin, perfectly 2-celled, white-silky, about 1.5 cm. long, more than twice as long as the calyx, tipped with a slender beak which is abruptly hooked at the apex.

This belongs to the *A. campestris* group and is characterized by the coarse spreading pubescence of the scape and the ochroleucous flowers without any trace of purple.

MONTANA: Craig, 1900, *E. V. Wilcox*, 378 (type in U. S. Nat. Herb.).

***Trifolium lilacinum* sp. nov.**

A densely caespitose dwarf subscapose perennial with very deep root. The short branches of the caudex covered with the scarious stipules and remains of old leaves: leaves 3-foliolate, bright green; petioles 2–6 cm. long, strigose: leaflets elliptic or lanceolate-oblong, acute at each end, 1–2.5 cm. long, strigose: peduncle 5–12 cm. long, bracts minute, less than 1 mm. long, 3-toothed: flowers reflexed in fruit: calyx densely strigose; tube 3 mm. long; teeth subulate-filiform, 4–6 mm. long: corolla pale rose-purple or lilac, in age turning light brownish, about 1 cm. long; banner straight and obtuse.

This species is related to *T. dasyphyllum*; differing in the minute 3-toothed bracts and their shorter and comparatively broader leaflets. It is still nearer related to *T. acuminatus* Greene; from which it is distinguished by the smaller flowers and the not acuminate banner. It is an alpine plant growing among rocks at an altitude of about 3000 m.

COLORADO: West Spanish Peak, 1900, *Rydberg & Vreeland*, 5950 (type), 5951 and 5952.

***Lathyrus leucanthus* sp. nov.**

A glabrous or slightly pubescent perennial with a very slender rootstock. Stem about 3 dm. high, angled: stipules very narrow, semi-sagittate: leaflets 2–4 pairs, elliptic, veiny, glaucous, acute, mucronate, 1–3 cm. long, 3–10 mm. wide: tendrils of the lower leaves mere tips; of the upper elongated and sometimes 3-divided: racemes short, in the axils of the middle leaves, 3–4 cm. long, 2–4-flowered: calyx glabrous, cleft to about the middle: lobes lanceolate, acuminate: corolla white, about 15 mm. long: banner broad.

This is nearest related to *L. Arizonicus*, but differs in the broader leaves and banner. It grows at an altitude of 2400–3000 m.

COLORADO: Ojo, 1900, *Rydberg & Vreeland*, 6020 (type); Pass Creek, 6021; West Indian Creek, 6022; mountain near Veta Pass, 6023; Veta Pass, 1890, *Mr. and Mrs. G. H. Hicks*, 19; Ridgway, 1895, *F. Tweedy*, 239.